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THE GRANTS URANIUM BELT
A REPORT TO THE STATE PLANNING OFFICER

A Report By:

The New Mexico State Planning Office
Division of Natural Resources



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This report is not considered a final document,
but part of a land use planning process which
will be changing as development changes, and
more or better information becomes available.
Any comments are appreciated.

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GRANTS URANIUM BELT

I. INTRODUCTION

The Grants Uranium Belt is an area 100 miles long, stretching from Gallup to the Rio Puerco, by 20 miles wide north of Highway 40¹ (see Figure 1). It is the most important uranium-producing district in the United States, estimated to contain one-half of the nation's uranium ore.² In 1974, New Mexico produced 2,997,000 tons of uranium ore and 4,951 tons of uranium concentrate, 43 percent of the total United States production for that year.³ The 1974 value of the 4,951 tons of U_3O_8 was \$104,693,000.⁴ At present about 3,600⁵ people are employed in uranium exploration and production in the mining district with a yearly income of approximately \$35 million.

Ultimately, expansion of the uranium industry in the Grants Uranium Belt depends on national demand and national policy. Some experts project that by the year 2000 energy consumption in the United States will be three times as great as at present.⁶ Current national government energy policy is that a substantial portion of future energy will be generated by use of nuclear fuels. The Energy Research and Development Administration predicts that nuclear power plants will produce 40 percent of our total electric supply by 1990.⁷ There were, as of November 1975, 56 operating plants supplying 8 percent of all United States electric power. As of that date, 62 plants were under construction and 100 or more were on order.⁸ There could be 1,000 plants by the year 2000.

If the nuclear industry develops in this way, Dr. Glenn Whan of the University of New Mexico projects that by 1985 the industry will need three times as much ore, and that for New Mexico to maintain its percentage of uranium fuel production, one 2,500 ton/day capacity mill must be added each year.⁹ This would mean a substantial increase in income and employment to the State of New Mexico. How much of an increase would depend upon the mining and milling processes used by companies involved. However, projecting from a present employee/ton of uranium concentrate ratio, and using growth multiplier developed by the Planning Office to study Northwest New Mexico, there would be a population increase of 8,048 - 23,222 in or near the mining district by 1985. The greatest impact of this population would be on the Grants/Milan area (current population is estimated at 14,400 by the Grants City Manager's Office) and the areas around the mine and mill locations. Lesser but significant effects of uranium industry expansion would be felt in Gallup and Albuquerque. Expansion would mean increases in total income and additional tax revenues for state and local government. Expansion would also mean the need for more public and private investment to provide additional services. There is currently a great shortage of housing in the area and, according to the Grants City Manager, sewer and water facilities are operating at capacity. Traffic congestion is a major problem. Government units would need to provide more and better streets and roads, more schools, health facilities, recreation facilities, crime protection, and fire protection. Communities that have been recently faced with rapid population growth due to energy

development have been hard pressed to meet the demands placed upon them. Tax revenues tend to lag behind costs. The Wyoming Select Committee on Industrial Development Impacts analyzed the time required to balance local costs and revenues due to development in Wyoming and concluded that school districts would balance in one year after completion of a project, that counties would balance in three years, but that cities would take 25 years to balance local costs and revenues.¹⁰

According to the State Geologist's Office, if the uranium industry grows as ERDA predicts, economically recoverable, known reserves in the Uranium Belt will be depleted around the year 2000.¹¹ This would indicate that, left to their own resources, communities in the Uranium Belt might never realize positive benefit from uranium development. An additional problem for Grants and Milan is that, although most of the uranium industry employees live and require services in Valencia County, much of the industry is located in and pays taxes in McKinley County. Private money lenders are not willing to invest in housing and commercial development brought on by a boom situation when faced with a bust within 25 years. Shortages of commercial facilities and goods are causing spiraling costs, costs that are particularly harmful to those local people who are elderly or are on a fixed income. Local citizens in Grants and Milan are unwilling to impose more taxes on themselves to pay for increasing services to newcomers, particularly after having gone through one uranium boom in the 50's and a bust in the 60's.¹²

In addition to financial problems for communities

impacted by uranium industry development, there are serious health and environmental problems connected with expansion of uranium mines and mills. Beyond the considerable hazard factor associated with any mining activity, uranium mining and milling has the added dangers for workers of exposure to radiation and the threat of cancer. Despite evidence of a direct correlation between uranium and lung cancer, it was not until 1971 that the Atomic Energy Commission established ventilation and radiation standards for uranium mines and mills. Due to decades of unprotected working conditions, a 1969 prediction from the U.S. Public Health Service stated that "of the six thousand men who have been uranium miners, an estimated 600 to 1,100 (ten to eighteen percent) will die of lung cancer within the next twenty years because of exposure on the job."¹³ Although the standards that are now in effect have undoubtedly improved working conditions, long-range effects of low levels of continuous radiation exposure are not, as yet, clearly established.

The general public living in the Uranium Belt is also exposed to health hazards as a result of uranium activity. A September 1975 study done by the U.S. Environmental Protection Agency identifies groundwater contamination in the vicinity of several mines and at two subdivisions adjacent to the United Nuclear-Homestake Partners Mill, and identifies surface water contamination on the Rio Paguete.¹⁴

The control of tailings from uranium mills has been identified as the most important pollution problem with which the mining and milling industry must deal. Levels of radio-

activity high enough to warrant possible remedial action have been identified by the Environmental Protection Agency in two homes near Milan. This contamination is thought to have been caused by wind-blown, dry mill tailings.¹⁵ A 1976 Environmental Protection Agency study finds that persons living within a 1.3 mile radius of a tailings pile have a 1 percent greater risk of contracting cancer over their lifetime, and that people living within a 0.6 mile radius have a 3 percent greater cancer risk.¹⁶ It has been estimated that the accumulation of tailings could be 280 million tons by 1990. This would be enough radioactive material to cover the City of Albuquerque to a depth of 22 inches.¹⁷

Just how widespread radioactive contamination is in the Uranium Belt is uncertain due to inadequate monitoring systems. Standards that have been established to measure "safe" levels of radiation should be seriously questioned and tested. While the amount of radiation being emitted by a single mine or mill might be tolerable, the combined effect of a greatly expanded number of mines and mills could become intolerable.¹⁸ People living in the Uranium Belt, miners in particular, should be made aware that effects of radiation are cumulative and dangerous, and that any radiation exposure can be hazardous.

Other possible environmental effects of the uranium industry include the destruction of wildlife and wildlife habitat; disturbance of earth and vegetation that reduces or destroys the aesthetic and natural value of an area and causes erosion; and damage or destruction of archaeological and historic sites and

religious shrines (Mount Taylor is one of the four sacred mountains of the Navajo Tribe and has religious significance to the people of the Laguna and Acoma Pueblos--drilling or mining on the mountain is considered to be a desecration of a sacred shrine).¹⁹

As mentioned previously, expansion of the uranium industry will depend on how much nuclear power develops. Expansion of an ERDA-predicted magnitude is likely to be limited by several factors:

- 1) Unless the public is convinced that potentially catastrophic problems connected with nuclear power have been reasonably solved, the further construction of nuclear plants could be delayed, if not stopped. Although many nuclear experts believe that nuclear power is safe enough to go into full use right away, most would recognize that there remain unsolved problems associated with nuclear power. These problems come from dealing with a process and materials that are among the most toxic and dangerous known to man.

A recent EPA study estimates that a major nuclear reactor accident would quickly kill some 3,300 people and cause 66,000 to 330,000 delayed, cancer deaths over 20 to 30 years. The risk of such an accident happening

is estimated to be very low-- a nuclear regulatory commission report estimates once in a billion years of reactor time.²⁰ There has never been a "major" reactor accident such as the one described above; however, serious reactor accidents have occurred.²¹ Insurance coverage of a nuclear accident is limited by federal law to \$560 million; of this the private insurance industry, which finds "the catastrophe hazard...many times as great as anything previously known in industry,"²² provides \$110 million.²³ Recent estimates of the monetary damage that could be caused by a reactor accident range from \$17 billion to \$70 billion.²⁴

A "nuclear power plants initiative" that would have put a moratorium on nuclear plant construction until full compensation from nuclear accident loss be provided and until safety systems and nuclear waste disposal be shown effective was defeated in California recently by a 2 to 1 margin. The California legislature, however, passed the most stringent safety requirements in the nation before the vote on the initiative, and there are initiatives coming up in the future in other states that will effect future nuclear development.

The problem of permanent storage of nuclear wastes has not been solved. The most dangerous of

the nuclear waste products is plutonium, which will remain dangerous and must be kept isolated from the environment for hundreds of thousands of years. It has been estimated, if it were to be dispersed throughout the country, that one ounce of plutonium would be more than enough to exceed the permissible body burden established by AEC for the entire population of the United States. If present nuclear development plans were carried out, the electric power industry would create 22 million pounds of plutonium by 2000.²⁵

An atomic bomb can be produced from the plutonium from a nuclear reactor, as has already been done by India. Expansion and export of nuclear technology means the increased international danger of more atomic bombs, increasing the chance that the bombs will be used.

Nuclear Power cannot be considered "safe" in any ordinary sense because of its extraordinary characteristics and because we must take extraordinary means to protect ourselves from it.

- 2) As public concerns continue and safeguards on nuclear development increase, the cost of nuclear power increases. Nuclear plants have not operated as well in the past as fossil fuel plants; the contention is

made that elaborate precautionary systems make frequent nuclear plant shutdown unavoidable.

Business Week, in November 1975, notes that the economic advantage nuclear plants were once proclaimed to have over coal plants is becoming less clear. In hearings before the Public Service Commission, nuclear proponents are now only going so far as to say that a nuclear plant is "in no way inferior to other sources."²⁶

Business Week concludes that, with problems of nuclear power becoming more evident, development of an alternative power source could mean the end of nuclear power, though, the article says, there is no good alternative presently available.²⁷ Even proponents of nuclear power admit that a major nuclear reactor accident could also bring an end to nuclear development.

- 3) While some experts project that energy consumption in the United States will be three times as great by the year 2000 as it is at present, others contend that with effective energy conservation, the present rate of energy production would be sufficient to take us through the year 2000. One of the problems the nuclear industry has encountered in living up to its growth projections has been a flattened growth curve in the demand for power. It is estimated that one-half of the energy consumed in this country

is wasted. It does not seem unrealistic to assume that some conservation will take place as energy becomes more scarce and more expensive, even if the country does not reach a stage of energy efficiency by the year 2000.²⁸

- 4) While current national government policy calls for "substantial" use of nuclear fuels, the 1976 Democratic Party Platform calls for "minimum dependence on nuclear power."²⁹

It has been predicted that the uranium industry in New Mexico could reach a multi-billion dollar level within a decade, becoming the most important economic activity in the history of the state.³⁰ This would mean revenue for the state, and more jobs and income for New Mexicans. But, along with possible benefits, the costs and uncertainties of uranium development must be considered. The value of the uranium product should be made to pay the costs associated with its production. The state should make certain it receives adequate payment for the severance of a nonrenewable natural resource; local entities need money to accomodate the growth caused by uranium development as the growth occurs and to its total extent. On the other hand, a tax too high could be damaging to the investment climate in New Mexico. The most realistic and prudent action for the state to take would be to encourage, through its policies, a slow and careful development of the uranium industry. Moderate development could assure uranium activity beyond the year 2000, and would give state and local entities a better opportunity to maximize the benefits of development,

if indeed development is determined to be beneficial.

From studies that have been done on energy impacts, a Department of Housing and Urban Development publication on rapid growth reports that a community growth rate of ten percent puts a strain on service capability and a fifteen percent rate causes institutional breakdown.³¹ Grants and Milan have experienced an approximate five percent annual growth rate since 1970, and will experience growth rates of from four to eighteen percent through 1985 from our projections. The HUD report finds that past experience has shown the greater the growth, the more severe the impact will be. A more moderate growth rate allows for public services to keep up with demand and promotes a more stable and balanced growth.³²

There is a need for the citizens of communities that will be effected by growth to decide for themselves what kind of future they want and to have available to them planning assistance to help assure that as development comes, it will improve the overall quality of life in their communities. Moderate development would help insure against the uncertain situation faced by the nuclear industry and would help avoid the danger of overcommitment of public and private investment to service an industry that may or may not grow to the extent predicted by its proponents. Many of the social problems, including a high crime rate and high incidence of alcoholism and drug abuse, associated with a "Boom-Town" could be mitigated and better handled.³³ Moderate development would give time for the action necessary to keep environmental degradation to a minimum. With more time people of the area can be made aware of the health hazards involved in uranium activity and decide

themselves what risks are tolerable to them. Slower uranium development would mean a better chance to develop and enforce adequate health standards and safeguards. If the health hazards involved are determined to be acceptable to New Mexicans, time would allow more New Mexicans to be trained to fill high-paying jobs in the uranium industry. New Mexico should do its part to help the nation meet legitimate energy needs, but should, at the same time, make certain that its land and its citizens do not become part of the "national sacrifice area" that a Department of Housing and Urban Development study on National Growth predicts the energy resource-rich western lands could become.³⁴

FOOTNOTES

1. Gordon Page, Deputy New Mexico State Geologist, December 1975.
2. Mining Engineering, August 1974, page 17.
3. New Mexico Progress, October 1975, page 1.
4. Statistical Data on the Uranium Industry, ERDA, 1975.
5. Approximate Total from Interviews with Uranium Companies (see Chapter II).
6. Samuelson Report, Nuclear Power and the Shearon-Harris Plant, June 1973, page 11.
7. Glenn A. Whan, "Nuclear Energy in New Mexico," ENERCON, November 1975, page 3.
8. Cynthia West and Robert Hudspeth, Department of Development, December 1975.
9. Glenn A. Whan, op. cit., page 3.
10. Interim Report and Recommendations, Legislative Select Committee on Industrial Development Impact, Wyoming State Legislature, December 1974.
11. Gordon Page, Deputy New Mexico State Geologist, December 1975.
12. Boomtown Problems, conference in Grants, N.M., June 28-30, 1976.
13. Peter Metzger, The Atomic Establishment, (New York: Simon and Schuster, 1972).
14. U.S.E.P.A. Water Quality Impacts of Uranium Mining and Milling Activities in the Grants Mineral Belt, New Mexico, Dallas, Texas, September 1975.
15. "Milan Homes Slated for Possible Remedial Action," Seers, April 9-23, 1976, page 8.
16. U.S. Environmental Protection Agency, "Potential Radiological Impact of Airborne Releases and Direct Gamma Radiation to Individuals Living Near Inactive Uranium Mill Tailings Piles," Washington, D.C., January 1976, Page V.
17. Dr. Jerry Boyle, "The Coming Multi-billion Dollar Uranium Industry in New Mexico," January 30, 1976, page 8.
18. Al Topp, Radiation Division, Environmental Improvement Agency, February, 1976.

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19. John Redhouse, testimony before the Legislative Energy Committee, Grants, New Mexico, April 2, 1976.
20. "Study Hikes N-Accident Death Estimate," The New Mexican, June 25, 1976, page A2.
21. See "How Browns Ferry Skirted Disaster," Business Week, November 1975, page 105.
22. Samuelson Report, op. cit., pages 69 and 70.
23. From April 19, 1976 correspondence from Linda A. Freytag, United Nuclear Industries, Inc.
24. Dr. Charles Hyder, Southwest Research and Information Center, "A Partial Critique of Grants Uranium Belt Report," June 2, 1976, page 4.
25. New Mexico Citizens for Clean Air and Water, "A Nuclear Power Policy," March 18, 1975, page 4.
26. "Nuclear Hearing is Started," Albuquerque Journal, July 7, 1976.
27. "Why Atomic Power Dims Today," Business Week, November 17, 1975, pages 98-106.
28. Governor's Youth Conference on Nuclear Energy, April 26, 1976.
29. The Albuquerque Journal, June 20, 1976, page B-d.
30. Dr. Jerry Boyle, op. cit., page 1.
31. Department of Housing and Urban Development, Rapid Growth from Energy Projects; Ideas for State and Local Action, 1976, page 2.
32. Ibid., pages 1 and 2.
33. See "Boom Means More Crime, Bigger Social Problems," Grants Daily Beacon, June 29, 1976, page 1.
34. Land Use Planning Reports, January 19, 1976, page 3.

II. URANIUM INDUSTRY ACTIVITY IN THE GRANTS URANIUM BELT

Present activities and exploration are taking place in four major areas: Marquez/Cebolleta/Laguna, San Mateo/Mount Taylor/Ambrosia Lake, Crownpoint/Smith Lake, and Churchrock. Exploration has occurred throughout the mineral belt and into the Framington area. (A study on the "Navajo-Exxon" uranium project will be prepared at a later date.)

If we divide the uranium activity into areas and rough land ownership, we find the following generalities: the Marquez, Cebolleta, and Bibo activities are on private land grants; the Laguna/Paguato activities are on Indian land; the Mount Taylor activities are on U.S. Forest land; Ambrosia Lake activities are mostly on private lands, but with a mix of state and Bureau of Land Management ownerships; Smith Lake area is mostly Indian land, but with a little private and state land; Hosta Butte is Indian land; Crownpoint is a mix of Indian, state, and Bureau of Land Management land; Mariano Lake is Indian land; Churchrock area is Indian, private, state, and Bureau of Land Management land. Active leases in these areas would have to be identified by the companies and owners.

A rough picture of ownership throughout the Uranium Belt indicates the following:

Private Land	18.5 percent
Private Land Grants	15.8 percent
State Land	3.9 percent
Indian Land	47.0 percent
U.S. Forest Service	9.2 percent
Bureau of Land Management	4.9 percent
Military	0.7 percent

TOTAL

100.0 percent

Several problems have surfaced regarding ownership and jurisdiction in the Uranium Belt. One is Navajo Tribal authority on those non-reservation Navajo lands of the checkerboard area. Others deal with ownership of leases on private lands. The Mining Law of 1872 also allows many exploration activities on federal land that are not adequately controlled. Major problems in this area are vegetation destruction through development of access roads and drilling pads.

Among the many environmental problems, elaborated upon later in this paper, are the ground water pollution by radioactive materials; erosion hazards as a result of vegetative destruction; unplugged and uncapped exploration holes which penetrate aquifers or water-bearing strata; uranium mill tailing piles; dewatering of mine shafts, disposal of the water; and emissions from mine ventilation shafts.

The following companies account for most of the present uranium production activity:

Kerr-McGee Nuclear Corporation - operates seven mines and one mill at Ambrosia Lake where 1,292 people are employed. The total Kerr-McGee payroll is \$18 million/year. The Kerr-McGee mill is the nation's largest, with a nominal milling capacity of 7,000 tons of uranium ore per day. The Company operates a bus system for employees, and owns 69 trailers in Grants and five in Churchrock which it rents to employees. Kerr-McGee expects to expand by 90 employees at Ambrosia Lake and by 70 employees at Churchrock. The Company is considering a mine near Marquez where 200 people would be employed.¹

United Nuclear-Homestake Partners - operates four mines at Ambrosia Lake where 266 people are employed. A 3,500 ton/day capacity mill is located on Highway 53 between Grants and Ambrosia Lake, where 161 people are employed. The total payroll is \$4.5 million/year. The company provides recreation facilities and owned 276 employee houses in Grants, which it sold to its employees. The Partnership predicts no expansion.²

United Nuclear Corporation - operates four mines in the Ambrosia Lake area where 150 people are employed, and one mine at Churchrock where 350 people are employed. An open-pit mine under construction in the Cebolleta area will employ about 100 people. A 3,000 ton/day mill is planned for the Churchrock area, to be operational by June, 1977. This mill will employ 100 to 130 people. The Company operates a bus from Grants to Churchrock. It owns a 24-unit apartment complex and a 40-unit trailer park in Gallup. Its present payroll is approximately \$1.5 million/year. The Company expects to open more mines and have about 600 people employed in the Churchrock area within the next year or two. United Nuclear expects to expand to 200-250 employees in the Grants area in the next few years.³

Anaconda Company - operates open-pit and underground mines at Laguna where 579 people are employed. Most of the employees are Indians who live in the area. The Company provides 19 single family houses for technical and salaried personnel. The 3,000 ton/day capacity Bluewater Mill is located eight miles west of Grants on Highway 66 where 327

people are employed. The Company provides recreational facilities, including a swimming pool, bowling alley, and golf course, and 87 houses for technical and salaried personnel at Bluewater. The total payroll of the Anaconda Company in the mining district is approximately \$10 million/year. Anaconda expects a 25 employee expansion at Laguna as the Jackpile open-pit mine is phased out and the underground mines are developed more intensively.⁴

Rancher's Exploration and Development Corporation - operates the Johnny M. Mine located between San Mateo and Ambrosia Lake. This Company employs 120 people and has a \$1.2 million annual payroll.⁵

Sohio Petroleum Company and Reserve Oil and Mineral Corporation - expects to have a mine and mill operation in the Cebolleta/Bibo area in 1976. The Partnership expects to employ 280 people in this complex. Nominal capacity of the mine is to be 1,000 tons/day; that of the mill is 1,660 tons/day.⁶

Gulf Mineral Resources - is now constructing a mine and expects to have a mine/mill operation employing 400 to 500 people located off Mount Taylor at San Mateo. Gulf is proposing another mine at Mariano Lake. The number of employees is not known at this time.⁷

Tennessee Valley Authority-Mobil Oil Corporation - expects to have a mine operation in 1977 employing 400 people at Crownpoint. Tennessee Valley Authority-Mobil Oil expects to operate this mine for ten years. (Tennessee Valley Authority presently operates 13 nuclear power plants.)⁸

Phillips Petroleum Company - has discovered uranium near Crownpoint. The Company tentatively plans to sink a mine shaft next year and

expects to have a mine/mill operation employing 400 to 500 people by 1981.⁹

Exxon Company and Continental Oil - have uranium interests and are doing exploration in the area, employing nine and fourteen people respectively. Exxon has a mineral lease on 180 acres in the Town of Marquez from the State Game and Fish Department. Conoco is doing feasibility studies on putting mines in the Crownpoint area and in the Laguna area.¹⁰

Bokum Resources Corporation - has been in exploration activities and plans to expand into mining, employing 300 people at Marquez. Bokum has 11 employees at present.¹¹

Western Nuclear Company - is opening a mine at Smith Lake with 35 employees. They plan another mine with 35 employees within two years and a third with 30 employees within five years.¹²

Homestake Mining Company - operates the F-33 Mine near Grants with 14 employees. The Company plans to close the mine within three months and, although, it has no definite plans for expansion, the Company is "looking".¹³

Grace Nuclear Company - has two in-situ facilities, one between Marquez and the Rio Puerco, and one near Churchrock. The Company has a heap leaching process near Magdalena. A maximum of 15 people are employed.¹⁴

Hydro-Nuclear Company - is planning a solution mining process at Ambrosia Lake and is also considering processing the water supply of the City of Grants to remove the uranium.¹⁵

Century Geophysical Company - provides various exploration services to the uranium industry, presently employing 28 people in the mining district.¹⁶

Construction and development companies involved in the uranium industry include Greater Navajo Development Enterprises, Harrison Western, Kell Construction Company, Kop-Ran Drilling Corporation, Fluor-Utah Construction Company, and the South Praire Construction Company.

Most of the companies interviewed remarked on the difficulty of finding qualified personnel. Many of the employees have been brought in from out-of-state. According to Dale Glass of the Middle Rio Grande Council of Governments, Mobil Oil Company would hire 500 qualified miners now if they could be found.¹⁷

The State of New Mexico, through the Governor's Office and the Department of Development, and with the aid and support of area mining companies, has initiated an underground uranium miner training program at the Grants Branch of New Mexico State University. The program is funded for five classes, graduating 25 miners every 12 weeks (two weeks classroom training, ten weeks underground training). Al McCord of the Department of Development estimates that a trained uranium miner with two years experience can make \$30,000 to \$40,000 per year. The first class started March 15, 1976.¹⁸ It is interesting to note here that, according to a representative of Gulf Mineral Resources Corporation, as many as one-half of all newly trained underground miners give up the occupation after one year in the mines.¹⁹

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The following table is a summary of mines and mills and employee expansion in the Grants Uranium Belt.

<u>MINES AND MILLS IN GRANTS URANIUM BELT</u>		
<u>District</u>	<u>Employee Expansion</u>	<u>Company/Facility</u>
Laguna .	25*	Anaconda Jackpile Mine (Laguna) Anaconda H-1 Mine (Laguna) Anaconda P-9-2 Mine (Laguna) Anaconda P-10 Mine (Laguna)
	280*	Sohio L-Bar Ranch Mine (Bibo)* Sohio L-Bar Ranch Mill (Bibo)*
	100*	United Nuclear Open-Pit Mine (Bibo)* Grace Nuclear In-Situ Facility (between Marquez and Rio Puerco)
	300*	Bokum Resources Corporation Mine (Marquez)*
	200*	Kerr-McGee Rio Puerco Mine (Marquez)*
Grants		Kerr-McGee Section 17 Mine (Ambrosia Lake)
		Kerr-McGee Section 19 Mine (Ambrosia Lake)
		Kerr-McGee Section 22 Mine (Ambrosia Lake)
		Kerr-McGee Section 24 Mine (Ambrosia Lake)
	90*	Kerr-McGee Section 30 Mine (Ambrosia Lake)
		Kerr-McGee Section 30 West Mine (Ambrosia Lake)
		Kerr-McGee Section 35 Mine (Ambrosia Lake)
		Kerr-McGee Section 36 Mine (Ambrosia Lake)
		Kerr-McGee Mill (Ambrosia Lake)
		United Nuclear-Homestake Partners Section 15 Mine (Ambrosia Lake) United Nuclear-Homestake Partners Section 23 and General (Ambrosia Lake)

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<u>District</u>	<u>Employee Expansion</u>	<u>Comapny/Facility</u>
Grants Continued		United Nuclear-Homestake Partners Section 25 Mine (Ambrosia Lake) United Nuclear-Homestake Partners Mill (Highway 53)
		Rancher's Exploration and Development Corporation Johnny M. Mine (between San Mateo and Ambrosia Lake)
	400-500**	Gulf Mineral Resources Mine (San Mateo)** Gulf Mineral Resources Mill (San Mateo)**
		Homestake Mining Company F-33 Mine (Grants)
		Anaconda Mill (Bluewater)
		United Nuclear Corporation Ann Lee Mine (Ambrosia Lake)
	100*	United Nuclear Corporation Section 27 East Mine (Ambrosia Lake)
		United Nuclear Corporation Sandstone Mine (Ambrosia Lake)
		Hydro-Nuclear In-Situ Facility (Ambrosia Lake)*
Crownpoint		Western Nuclear, Incorporated Western 21 Mine (Smith Lake)
	70*	Western Nuclear, Incorporated Mine (Smith Lake)*
	30*	Western Nuclear, Incorporated Mine (Smith Lake)**
	400*	TVA-Mobil Oil Corporation Mine (Crownpoint)**
	400-500**	Phillips Petroleum Company Mine (Crownpoint)** Phillips Petroleum Company Mill (Crownpoint)**
		Gulf Open-Pit Mine (Mariano Lake)*
Gallup	70*	Kerr-McGee Churchrock Mine (Churchrock)

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<u>District</u>	<u>Employee Expansion</u>	<u>Company/Facility</u>
Gallup Continued		United Nuclear Corporation Northeast Churchrock Mine (Churchrock) United Nuclear Corporation Mill (Churchrock)* Grace Nuclear In-Situ Facility (Churchrock)

Total two year expansion = 1,885 employees

Total five year expansion = 2,915 employees

* Facility and employee expansion to be operational within two years

** Facility and employee expansion to be operational within five years

Uranium ore now mined and milled into "yellowcake" or uranium oxide in New Mexico then goes to one of two places: Allied Chemical at Metropolis, Illinois, or Kerr-McGee at Sequoyah, Oklahoma. These two plants convert U_3O_8 into uranium hexafluoride (UF_6). This material is then shipped to enrichment plants owned by the United States Government. Currently, three enrichment plants are in operation using the gaseous diffusion process. These are located near Oak Ridge, Tennessee; Paducah, Kentucky; and Portsmouth, Ohio. After enrichment comes fuel fabrication. The UF_6 is converted to uranium dioxide and placed in fuel rods and assemblies for reactors. This work is done by reactor manufacturers such as Westinghouse, General Electric, and Babcox and Wilcox.

FOOTNOTES

1. Telephone interview with Mrs. Stover of the Kerr-McGee Nuclear Corporation, December 1975.
2. Telephone interview with Mr. Brasfield of United Nuclear-Homestake Partners, December 1975.
3. Telephone interview with United Nuclear Corporation, January 1976.
4. Telephone interview with Mrs. Georgia Laird of Anaconda Company, December 1975.
5. Telephone interview with Mrs. Hatcher of Rancher's Exploration and Development Corporation, December 1975.
6. Telephone interview with O.D. McDaniel of Sohio/Reserve, December 1975.
7. Telephone interview with Larry Manzanares of Gulf Mineral Resources, December 1975.
8. Discussion with George Devaney of Tennessee Valley Authority, December 1975.
9. Telephone interview with Mr. Clark of Phillips Petroleum, December 1975.
10. Telephone interviews with Exxon and Conoco, December 1975.
11. Telephone interview with Bokum Resources Corporation, January 1976.
12. Telephone interview with Western Nuclear Company, December 1975.
13. Telephone interview with Homestake Mining Company, January 1976.
14. Telephone interview with Grace Nuclear company, January 1976.
15. Telephone interview with Hydro-Nuclear Company, January 1976.
16. Telephone interview with Century Geophysical Company, December 1975.
17. Telephone conversation with Dale Glass, March 1976.
18. Telephone conversation with Al McCord, March 1976.
19. Conversation with Donna Davidson, March 1976.

III. POPULATION GROWTH AS A RESULT OF URANIUM DEVELOPMENT

The following figures are used to estimate population growth as a result of the two year=1,885 employee expansion and the five year=2,915 employee expansion projected by the uranium industry in the Grants Uranium Belt:

1. The indirect-to-direct job ratio ranges from 0.5 to 1.0.

This means that for each job generated directly by new energy industry development from one-half to one job will be generated in a service industry. The 0.5 figure is proposed as appropriate for energy development by Larry Adcock of the Bureau of Business and Economic Research; the 1.0 figure is proposed by R.L. Lindauer, Jr., who is a consultant to the Exxon Company. The WESCO Study by the Bureau of Reclamation, the Battelle-Columbus Study done for Exxon, and the Navajo-Exxon Study by the Bureau of Indian Affairs use an approximate 0.7 ratio for initial impact which falls within the 0.5 to 1.0 range.

2. According to a March, 1976 estimate by the New Mexico Employment Security commission, there are 3,943 unemployed people in Valencia, McKinley, and San Juan Counties. Energy project developments plus the Navajo Irrigation Project could employ 8,468 new people within two years. Adding indirect jobs would mean a total of 12,702-16,936 jobs. Local unemployed people could fill 23-31 percent of these jobs. Unemployment figures include only those people currently

looking for jobs, however, and it is reasonable to assume that if more jobs were available, more local people than those now on unemployment lists would want jobs. In a study of the impact of the Public Service Company's San Juan Generating Units, the Bureau of Business and Economic Research assumes 60 percent local employment based on the experience of past developments in the region. From the above, we assume that 40% to 77% of new jobs will be filled by nonlocal people coming into the area.

3. From the 1970 census of population by the U.S. Department of Commerce, the average number of employees per household in New Mexico is 3.29.

The figures given for Grants/Milan are based on the 1960 census when 56 percent of all New Mexico uranium workers lived in the Cities of Grants and Milan. It is not unlikely that present activity will reflect the past percentage. Albuquerque will also attract a number of miners, but in general a miner will have a tendency to live near the mines and commute for no more than thirty minutes. Administrative or executive level employees will probably be willing to commute as far as an hour one way. Gallup and the small localities adjacent to mine and mill locations will attract significant numbers of miners; however, we have not at present made projections as to what those numbers might be.